Oct. 24, 1950 E. E. DU FAY 2,527,093

SPRAY NOZZLE FOR PAINTS AND THE LIKE

Filed May 26, 1947

Fig. 1

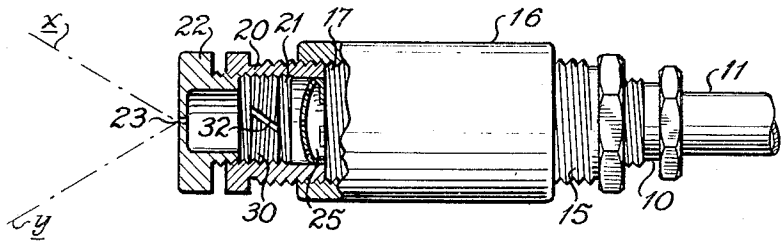


Fig. 3

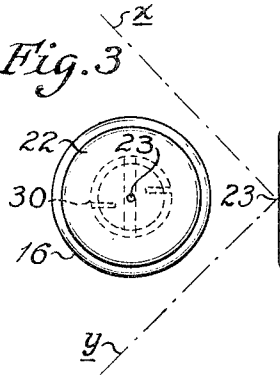


Fig. 2

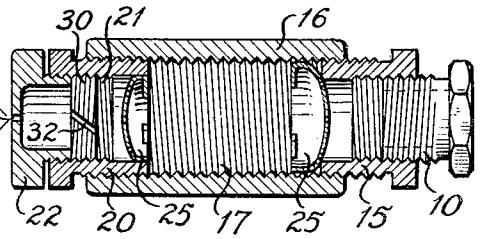


Fig. 4

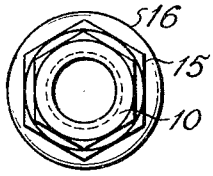


Fig. 8

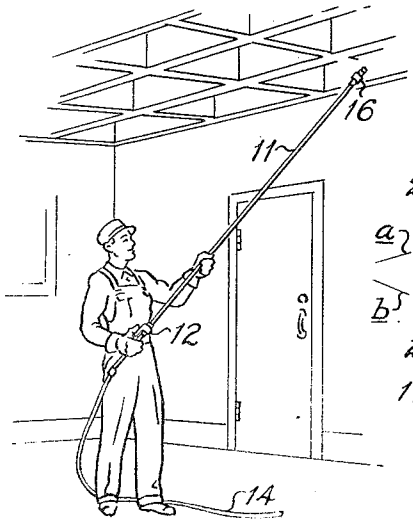


Fig. 6

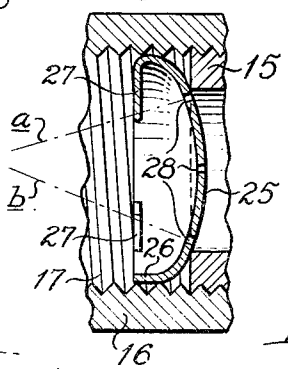


Fig. 5

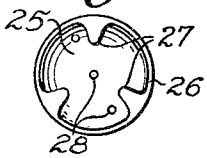
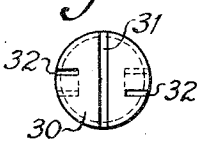


Fig. 7



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SPRAY NOZZLE FOR PAINTS AND THE LIKE

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2 Claims. (Cl. 299—120)

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My invention relates to a nozzle from which paint or other liquids may be issued in the form of a fine spray to lodge upon a confronting surface which is to be treated. In the use of this nozzle the paint is fed under pressure from a pump to the nozzle wherein the pigments or other solids in the paint are completely dispersed and conditioned for discharge, along with the vehicle in which they are contained, in the form of an air-free spray.

The nozzle herein to be described is very simple, inexpensive, and rugged in its construction. It embodies mainly certain standard fittings which are separably interconnected to cooperate with each other and with certain special parts to disperse the solids contained in the paint stream, as it is passed through the nozzle under pressure, for spray discharge through the orifice at the exit end of the nozzle. The several parts of the nozzle are so combined as to permit of ready adjustment and also separation of one with respect to another whereby to adapt the nozzle for best performance depending upon the conditions of its use, and to facilitate cleaning thereof at the conclusion of each painting operation.

A suggestive embodiment of my invention is set forth in the accompanying drawing wherein:

Figure 1 is a view in elevation, and partly in longitudinal section, showing the nozzle with its parts adjusted for a spray which is relatively coarse and narrow in its angle of discharge;

Fig. 2 is a central longitudinal section through the nozzle, the parts here being shown as adjusted for a spray which is relatively fine and wide in its angle of discharge;

Fig. 3 is an elevational view looking toward the discharge end of the nozzle;

Fig. 4 is an elevational view of the inlet end of the nozzle;

Fig. 5 is a view in elevation looking toward the concave face of one of the two spray buttons;

Fig. 6 is an enlarged fragmentary view in transverse section of one spray button and adjacent parts;

Fig. 7 is an end elevation of the fan button, looking toward the face thereof which is proximate to the discharge end of the nozzle; and

Fig. 8 is a view illustrating the manner in which the present spray nozzle may be used when applying paint to the ceiling or walls of an industrial building.

In the present nozzle I may employ at its inlet end a conventional bushing 10 to which is connected a conduit pipe 11 serving as a handle in

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the use of the nozzle. This pipe is several feet long, depending upon the distances to be reached by the operator. At its end remote from the nozzle, the pipe is equipped with a valve 12 adapted to be opened by hand pressure whenever painting is to be performed. The pipe at its lower end is connected to a flexible tube such as a hose 14 of perhaps a hundred or more feet which leads to a hydraulic pump in communication with a drum wherein a supply of the paint is maintained to be stirred from time to time. No air under pressure need be introduced into the paint body or brought into contact with its surface at any stage of the operation. Since the pump and supply drum per se form no part of my invention, no showing of these units is included in the drawing.

The inlet bushing 10 is in screw threaded connection with a second bushing 15 whose exterior threaded surface is in threaded engagement with one end of a coupling sleeve 16 whose internal threads 17 are desirably continued from end to end. Another bushing 20 formed with internal threads 21 is screw threaded to the other end of the coupling sleeve, and carries at its outer end a tip in the form of a hollow plug 22 in whose end wall is provided an axial discharge orifice 23. The drill size of this orifice is desirably about 50 guage. By the interconnection between the several bushings, sleeve, and tip, each separable from the others, there is provided a continuous tubular nozzle structure open only at the inlet and outlet ends.

Within the nozzle is fitted a pair of spaced spray buttons, one supported by the coupling sleeve 16 and the other by one of the adjacent bushings 15 or 20. As shown, each spray button is in the form of a dished disc 25 having a marginal flange 26 from which is inturned a plurality of tines 27, three being the number suggested (Fig. 5). The marginal flange of each disc is of the proper outside diameter and form to engage with and be held releasably by the surrounding walls of the supporting coupling sleeve or bushing, as the case may be. The concave sides of the two discs are preferably faced toward each other, and the distance which separates them may be varied by a rotative adjustment of the bushing which supports one of them. The space between these discs, to be referred to as a primary solids dispersal chamber, is defined in part by the cylindrical walls of the coupling sleeve upon whose inner surfaces the threads 17 provide, in effect, extended ridges or roughened faces for a purpose which will presently appear.

Each disc is apertured with holes **28** whose drill size may be about 50 guage, one hole being desirably in the center and others relatively distant therefrom. Three such holes are indicated in Figs. 5 and 6, all in line, the two outer holes having their axes normal to the disc at the points where they are located, as indicated by the broken lines *a* and *b*.

A so-called fan button **30** is fitted into the bushing **20** which lies proximate to the tip **22**. This button remains spaced from the proximate spray button to define therewith a secondary solids dispersal chamber. As shown, the fan button **30** is a rather thick wall exteriorly screw threaded for coaction with its supporting bushing and for adjustment longitudinally therein in response to rotation thereof as by actuation of a screw driver (not shown) which may be operatively fitted into a slot **31** that extends diametrically across its face which is proximate to the tip. This button is formed with a spiral channel **32** (preferably two or more of them symmetrically disposed about its circumference) which is pitched between its inner and outer faces along the periphery of the button. The button defines with the walls of the hollow tip a discharge chamber from whose orifice **23** the paint is free to escape in the form of a fan-like spray. The character and form of this spray depends upon several factors, one of which is the longitudinal position of the fan button relative to the tip. When advanced to its limit toward the tip (see Fig. 2), the issuing spray will be relatively wide in its angle of discharge as suggested by the broken lines *x* and *y*, the paint particles being relatively small; when moved away further from the tip (see Fig. 1) an opposite effect will be produced. To shift the fan button toward or from the tip, relative rotation is produced between the fan button and its supporting bushing **20**, or between this bushing and the tip, or both.

Paints, and particularly oil paints, commonly contain pigments in the form of minerals which are finely ground. To apply the paint successfully, it is necessary always that the pigments be thoroughly dispersed throughout the oil vehicle. These pigments tend to agglomerate or coalesce into a mass or into lumps of varying size. This tendency of the pigment to refrain from remaining completely dispersed has defeated numerous attempts to apply such paints in the form of an air-free spray. According to this invention, the liquid paint is fed under a pressure of perhaps 100 lbs. through the flexible tube and out through the spray nozzle. No air is introduced into or onto the fluid stream at any point. But while passing through the nozzle the liquid paint requires to be further conditioned by a final and complete dispersal of the pigments in its vehicle. This operation takes place in the primary and secondary solids dispersal chambers into and from which the fluid paint passes in the form of streams. The peripheral walls surrounding both dispersal chambers are ridged as by the presence of the internal screw threads **17** and **21** formed within the coupling sleeve **16** and bushing **20**. The fluid paint which strikes these ridges is broken up so that a further and final separation of its agglomerated solids takes place at these points. In this operation the two sets of tines **27** which extend transversely into the primary solids dispersal chamber extend a noticeably beneficial aid. In entering this chamber the streams which are formed by passage through the disc holes **28** tend to converge, whereas in leaving an opposite condition develops. Just why this special feature should be beneficial is unknown to me, but experience has proven definitely that it is.

When leaving the secondary solids dispersal chamber, the fluid paint escapes through the helical channels **32** of the fan button to acquire a whirling motion which is communicated also to the liquid body that is momentarily trapped within the discharge chamber. From this chamber the paint which is now completely conditioned for spraying escapes through the discharge orifice **23**. In so doing it is transformed into a spray which fans out in the form of a cone having an angle that may be regulated as hereinbefore noted, the size of the spray particles being also varied by the same regulation. The spray appears as a cloud minus all noise or hissing sound. There is little or no tendency for these sprayed paint particles to float away and become lost. They spread themselves smoothly and uniformly in the form of a coating upon the proximate surface under treament. There is no streaking or running of the deposited paint, and the result is definitely superior in uniformity to anything attainable by an air spray. The amount of paint consumed is appreciably less, and the hiding value of the applied coating is noticeably enhanced.

A typical example of conditions under which the present spray nozzle may be used to advantage is suggested in Fig. 8 where I have shown a ceiling in a building structure of the mill type having exposed beams from which one or more pipes may be suspended to extend horizontally below the ceiling. The nozzle herein described will perform admirably when painting is done under such conditions, there being no appreciable loss of paint in the operation. In fact, the amount of paint used, as compared with a comparable job of hand painting, is very substantially less, the saving running up to 30 or 40 per cent. There is also a distinct saving in the amount of paint used over that which is required when applied by an air spray.

A desirable feature of the nozzle structure hereinbefore described is the separability of its various parts. At the completion of a painting operation, it is important that the nozzle be thoroughly cleaned out, as by the use of benzene or other solvent. No difficulty is involved with my nozzle in accomplishing this, since the bushings may be readily detached from the coupling sleeve, and the various buttons removed to facilitate the cleaning of all parts. In ordinary practice, little or no adustment of the parts will be required, but should the length of the various chambers be varied to produce more satisfactory results, this may be done by the simple expedient of rotating one part with respect to another, as required. Experience has demonstrated that the nozzle of my invention operates effectively with paints of various kinds such as oil paints, white washes, cold water paints, casein paints, etc., but it is perhaps with oil paints that the greatest benefit is realized.

I claim:

1. A spray nozzle for paints and the like comprising a tubular structure having at one end an inlet to receive fluid paint under pressure, a tip closing the opposite end of the tubular structure and provided therethrough with a discharge orifice, a fan button provided with co-radial pitched passageways for imparting a whirling motion to

the liquid passing therethrough, and means carried by the tubular structure spaced from the fan button defining a solids dispersal chamber, said means comprising a pair of spaced dished discs having stream forming openings normal to the faces of the discs and arranged to produce paint streams and direct the same toward the coradial pitched passageways, each disc being formed with a plurality of stream deflecting tines extending inwardly from its periphery, and there being in the body of each disc a plurality of holes each normal to the disc surface at the point of its location thereon.

2. A nozzle for air-free spraying fluid paint and the like including a tubular structure comprising an interiorly threaded sleeve and front and rear bushings exteriorly threaded for engagement with the sleeve at opposite ends thereof, each bushing being adustable endwise of the sleeve in response to rotation relative thereto, the front bushing being interiorly threaded, and spaced transverse walls consisting of concavo-convex spray buttons provided with stream forming openings disposed normal to the curved surfaces of the spray buttons, said transverse walls defining primary and secondary dispersal chambers within the tubular structure, a tip exteriorly threaded for adustable interengagement with the front bushing and provided with an interior discharge chamber and having a thin flat front wall located at the front outer extremity of the nozzle and closing the chamber of the tip except for a small axial discharge orifice, and a transverse wall adustably threaded for interengagement

with the front bushing and adustable toward and from the tip and provided peripherally with a pitched channel and spaced from the proximate chamber defining transverse wall, the liquid paint in passing through the tubular structure for discharge through the end orifice being required to pass through the primary and secondary solids dispersal chambers and impinge in stream formation against the interior surface of the tubular structure and thence through the pitched channel to acquire a whirling motion when entering the discharge chamber immediately preceding its escape therefrom, whereby the liquid paint is discharged in the form of a fanlike spray.

EARL E. DU FAY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,781,188	Neilson	Nov. 11, 1930
1,826,776	Gunther	Oct. 13, 1931
1,840,453	Keith	Jan. 12, 1932
1,996,884	Schellin	Apr. 9, 1935
2,064,178	Pickard	Dec. 15, 1936
2,065,161	Thompson	Dec. 22, 1936
2,210,846	Aghnides	Aug. 6, 1940

FOREIGN PATENTS

Number	Country	Date
5,021	France	Sept. 30, 1905
539,051	Great Britain	Aug. 26, 1941